

Claims

[1] An orthopedic implant assembly comprising:

A straight flexible nail of universal length being adapted in use for insertion into intramedullary canal of long bones for repositioning and fixing fragments of bones having ductility of 15-25% of elongation of nail on tensile stress and about 600 to 800 MPa ultimate tensile strength and made of stainless steel material having identical two ends and shaft where said ends are having blunt conical pathfinder tip and said shaft and said ends are having flexibility such that it can be bowed to any angle or curvature to adapt medullary canal and maintain relation of fragments of long bones having multiple contact points of fixation;

an optional proximal fixation device being adapted in use for insertion into medullary canal of long bones in combination with plurality of said flexible nails where said proximal fixation device is comprising solid intramedullary rod having the plurality of longitudinal grooves being deep less than one said flexible nail diameter and equally spaced around the periphery of the said rod, the said rod having head portion with internal threads adaptable to said end cap and said rod is tapering to a blunt point at the distal end and said shaft of said proximal fixation device is having optional plurality of holes in non grooved part for interlocking screws ;

an optional end cap being adapted in use with said proximal fixation device in combination with multiple said flexible nails where said end cap is comprising head part with plurality of holes for hooking the cut ends of said flexible nail and externally threaded part to be adapted to said internally threaded part of head of said proximal fixation device at final fixation;

and a plier-knurler cum cutter in temporary use when said flexible nails alone are in use comprising jaws with nose ,knurling surface , cutting part and handle part .

[2] An orthopedic implant assembly of claim 1 wherein said flexible nail characterized having mechanical property of ductility as percentage of elongation in range of 15-25% on tensile stress and at the same time having ultimate tensile strength of about 600 to 800 MPa.

[3] An orthopedic implant assembly of claim 1 wherein said flexible nail characterized having made from material like 316 L or 316 LVM stainless steel or other biocompatible material.

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[4] An orthopedic implant assembly of claim 1 wherein said flexible nail characterized having identical two said ends are having said blunt conical pathfinder tip for better gliding in medullary canal.

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[5] An orthopedic implant assembly of claim 1 wherein said proximal fixation device characterised having said solid intramedullary rod having plurality of said longitudinal grooves where said grooves being deep less than one said flexible nail diameter and equally spaced around the periphery of said rod for holding said flexible nails apart from one another.

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[6] A proximal fixation device of claim 1 and 5 characterised having said solid intramedullary rod wherein said solid rod is made from material like 316 L or 316 LVM stainless steel or other biocompatible material.

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[7] A proximal fixation device of claim 1 and 5 characterized having said solid intramedullary rod wherein said rod is tapering to a round blunt point for easy insertion into medullary canal.

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[8] A proximal fixation device of claim 1 and 5 characterised having said solid intramedullary rod wherein said rod is having plurality of said through holes in non grooved part of said shaft part placed in either transverse direction or an oblique direction to long axis of said shaft part of said proximal fixation device to receive said interlocking screws.

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[9] An orthopedic implant assembly of claim 1 wherein said plier-knurler cum cutter is characterised having said nose part, said jaw part having said knurler surface to give said knurling type effect to cut ends of said flexible nail and cutting part to cut the said flexible nail at the distance of 1 cm when said

nose part is touching the said entry point on surface of bone where said jaws are holding said flexible nail.

[10] A flexible intramedullary nail comprising:

5 a proximal fixation device characterised having solid intramedullary rod tapering to round blunt point and having plurality of longitudinal grooves where said grooves being deep less than one said flexible nail diameter and equally spaced around the periphery of said rod in combination with;
10 multiple flexible nails characterised having mechanical property of ductility as percentage of elongation in range of 15-25% on tensile stress and at the same time having ultimate tensile strength of about 600 to 800 MPa and having identical two ends and shaft where said ends are having blunt conical pathfinder tip and said shaft and said ends are having flexibility such that it can be bowed to any angle or curvature to adapt medullary canal and
15 maintain relation of fragments of long bones having multiple contact points of fixation ; a end cap being adapted in use with said proximal fixation device in combination with multiple said flexible nails where said end cap is comprising head part with plurality of holes for hooking the cut ends of said flexible nail and externally threaded part to be adapted to said internally
20 threaded part of head of said proximal fixation device at final fixation.

[11] The flexible intramedullary nail as defined in claim 10 wherein said proximal fixation device, said multiple flexible nails and said end cap are made from material like 316 L or 316 LVM stainless steel or other compatible material.

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[12] A method of stabilizing a fracture of a long bone of a patient comprising the steps of:

(a) An inserting proximal fixation device without holes for interlocking screws provided with a plurality of longitudinal grooves in the periphery thereof into
30 the medullary canal of the fractured bone ; and
(b) then inserting a flexible nail into each of said longitudinal grooves so that said pins are held apart in compression between the patient's bone structure and said proximal fixation device in a desired special arrangement

over short lengths of said flexible nails, with said flexible nails and said proximal fixation device being positioned ,at the completion of said step (b),said flexible nails are extended through the fracture zone and into the medullary canal of sound bone on both sides of the fracture; and

- 5 (c) then said end cap having plural holes in head part is attached to said proximal fixation device and said flexible nails are cut and hooked in said holes of said end cap.

10 [13] A method of claim 12 wherein said proximal device, said flexible nails, said end cap are made of metal, said proximal fixation device has a blunt pointed distal end and said proximal device is having internally threaded part to mate with externally threaded part of said end cap, said flexible nails are of circular cross section with pathfinder blunt conical tips, and said longitudinal grooves are equally spaced around the periphery of said proximal fixation device and are each of a depth less than one diameter of
15 the nail received thereby.

[14] A flexible interlocking intramedullary nail comprising:
a proximal fixation device characterised having solid intramedullary rod tapering to round blunt point and having plurality of longitudinal grooves
20 where said grooves being deep less than one said flexible nail diameter and equally spaced around the periphery of said rod and non grooved part of shaft part is having plural holes for interlocking screws in combination with; multiple flexible nails characterised having mechanical property of ductility as percentage of elongation in range of 15-25% on tensile stress and at the
25 same time having ultimate tensile strength of about 600 to 800 MPa and having identical two ends and shaft where said ends are having blunt conical pathfinder tip and said shaft and said ends are having flexibility such that it can be bowed to any angle or curvature to adapt medullary canal and maintain relation of fragments of long bones having multiple contact points of fixation ;a end cap being adapted in use with said proximal fixation
30 device in combination with multiple said flexible nails where said end cap is comprising head part with plurality of holes for hooking the cut ends of said flexible nail and externally threaded part to be adapted to said internally

threaded part of head of said proximal fixation device at final fixation; and plural interlocking screws .

- 5 [15] A method of stabilizing an unstable fracture of a long bone of a patient comprising the steps of:
- (a) An inserting proximal fixation device mounted on targeting device provided with a plurality of longitudinal grooves in the periphery and plural holes in non grooved part thereof into the medullary canal of the fractured bone; and
 - 10 (b) then inserting a flexible nail into each of said longitudinal grooves so that said pins are held apart in compression between the patient's bone structure and said proximal fixation device in a desired special arrangement over short lengths of said flexible nails, with said flexible nails and said proximal fixation device being positioned ,at the completion of said step (b),said flexible nails are extended through the fracture zone and into the
 - 15 medullary canal of sound bone on both sides of the fracture; and
 - (c) then said end cap having plural holes in head part is attached to said proximal fixation device and said flexible nails are cut and hooked in said holes of said end cap ; and
 - (d) then said interlocking screws are passed through said holes in said proximal
 - 20 fixation device either in transverse direction or angled direction.

- 25 [16] A method of claim 15 wherein said proximal device, said flexible nails, said end cap, said interlocking screws are made of metal, said proximal fixation device has a blunt pointed distal end and said proximal device is having internally threaded part to mate with externally threaded part of said end cap, said flexible nails are of circular cross-section with pathfinder blunt conical tips, and said longitudinal grooves are equally spaced around the periphery of said proximal fixation device and are each of a depth less than one diameter of the nail received thereby and said proximal fixation device is having plural
- 30 holes.